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Thriving under pressure: An exploration of research productivity in business Ph.D. programs

Ivana Milosevic

University of Wisconsin - Oshkosh


Ted A. Paterson

University of Idaho

A. Erin Bass

University of Nebraska at Omaha, aebass@unomaha.edu

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**Thriving under Pressure:
An Exploration of Research Productivity in Business Ph.D. Programs**

ABSTRACT

Ph.D. programs have always been difficult and stressful. However, as a variety of factors have led to a tightening of the academic job market, there is increased pressure on Ph.D. students to conduct innovative research that results in top-tier publications. Yet, there is a dearth of research analyzing how Ph.D. students respond to these demands and why some are able to successfully translate this pressure into publications, while others are not. In this study we integrate literatures on job satisfaction, intrinsic motivation, engagement, and thriving in order to conceptualize and empirically test a model of research productivity in Ph.D. programs. Our findings illustrate that Ph.D. students with higher levels of intrinsic motivation and satisfaction with their programs are more likely to be fully engaged in their scholarly work. In turn, the heightened engagement facilitates higher levels of thriving and ultimately higher research productivity. Using a sample of business Ph.D. students across the U.S., Europe, and Australia (N=259), we find support for all of our proposed relationships. We highlight several theoretical and practical implications of our study that can enhance business Ph.D. programs and students' scholarly success.

Keywords:

Ph.D. students; Research productivity; Thriving; Intrinsic motivation; Engagement

Thriving under Pressure:

An Exploration of Research Productivity in Business Ph.D. Programs

Research productivity has become the main currency for business schools, and thus the ability to publish in a field's primary journals has become a key indicator of scholarly productivity and knowledge creation (Certo, Sirmon, & Brymer, 2010; Gill, 2009; Pearce & Huang, 2012). As competition for space in leading journals rises, both seasoned professors and young scholars are faced with new challenges. Young scholars are particularly influenced by this shift as the expectation to produce high-quality scholarly publications early in one's academic career has become an imperative for those seeking academic employment (Pearce & Huang, 2012). Yet, systematic research into what determines a student's ability to publish early in their career is absent. Indeed, we know very little about what enables Ph.D. students to excel in their program as well as in their future careers. Understanding determinants of Ph.D. students' productivity is an important endeavor however, as Ph.D. students are the future educators in the field of management.

Understanding determinants of Ph.D. students' publication success is also relevant because the competitiveness of the hiring market for academic positions has resulted in a dramatic increase in the publication expectations of newly-graduated Ph.D. students. In the not-too-distant past, successful completion of required Ph.D. coursework and a promising dissertation were often adequate requirements to secure a tenure-track academic position. In the present context, where scholarly productivity is frequently the ultimate indicator of effectiveness, publications in scholarly journals are primary indicators of knowledge production and an individual's potential to be a significant contributor to the field (Certo et al., 2010). As such, whether a young scholar will obtain academic employment and opportunities to contribute to the

field will largely depend on their research potential and more specifically, their scholarly record during their Ph.D. program.

In this study, we draw on recent theoretical work exploring the experience of thriving at work (Spreitzer, Sutcliffe, Dutton, Sonenshein, and Grant, 2005) to develop and test a model of Ph.D. student research productivity. In this model, we focus on motivational, attitudinal, and behavioral antecedents of research productivity in Ph.D. students. Specifically, we suggest that intrinsic motivation and satisfaction with the program will enable students' engagement in scholarly activities and the subsequent experience of thriving (defined by the joint experience of learning and vitality, Spreitzer et al, 2005). This engagement will in turn facilitate research productivity. We emphasize these particular variables both because they are theoretically meaningful and because they have been found to predict individual performance, particularly in innovative contexts (Eagly & Chaiken, 1993; Judge, Bono, Thoresen, & Patton, 2001; Kahn 1990; Ryan & Deci, 2000).

This study tests the proposed relationships using a cross-sectional sample of 259 business Ph.D. students. By doing so, we look to extend current knowledge in three ways. First, we offer an initial glimpse into some of the predictors of Ph.D. student publication success, a very underexplored area yet one that is increasingly important. Second, we contribute to the literature on thriving at work by testing some components of the theoretical model in a new context and by clarifying its relationship with work engagement. Finally, we contribute to the literature on work engagement by empirically testing its role as a mediator in the motivation-performance relationship.

THEORETICAL CONTEXT

While much is known about satisfaction, productivity and engagement in traditional work environments, as well as about learning outcomes among undergraduate business students, there is a dearth of research about experiences of business Ph.D. students. Understanding experiences of business Ph.D. students is important, however, because their research endeavors during these formative years, as well as how they handle pressures to produce scholarly work, has a great impact on future management learning and education. More specifically, the “publish or perish” context in which young scholars operate today creates a relentless pressure to publish in a field’s premier journals (Certo et al., 2010; Gill, 2009). Indeed, current sentiments suggest that “there is an apparent increase in pressures for faculty members in management and other business disciplines to publish in the top journals in their field” (Singh, Haddad & Chow, 2007: 327). And, as the competition for sparse space in leading business journals increases, the expectation to produce early has become an imperative. Therefore, understanding Ph.D. students’ characteristics and perceptions of Ph.D. programs that may relate to Ph.D. students’ scholarly productivity is a critical endeavor. Thus, we set out to create and test a theory-driven model of scholarly productivity among Ph.D. students. In the remainder of the paper, we describe the development of the model, an empirical test of the model, and the implications of our findings. See Figure 1 for a visual depiction of the proposed relationships that are described in greater detail below.

 Insert Figure 1 about here

Our model builds upon the theoretical model of thriving at work developed by Spreitzer et al. (2005) in which both personal attributes and perceptions of the work context (in this case intrinsic motivation and satisfaction with Ph.D. program, respectively) result in the enactment of

certain agentic behaviors (e.g., task focus or engagement) which promote the joint experience of learning and vitality (i.e. thriving) and, in turn, outcomes associated with thriving (in this case, research productivity). Consistent with the growing literature on thriving at work (Carmeli & Spreitzer, 2009; Niessen, Sonnentag, & Sach, 2012; Paterson, Luthans, & Jeung, 2013; Porath, Spreitzer, Gibson, & Garnett, 2012; Spreitzer & Porath, 2012; Wallace, Butts, Johnson, Stevens, & Smith, 2013) we adopted this approach to explain Ph.D. student research productivity because thriving has been shown to be a strong predictor of work performance (above and beyond other attitudinal and behavior variables) especially when it comes to creative or innovative performance (Carmeli & [Spreitzer, 2009; Wallace et al., 2013](#)), like that involved in scholarly research.

Intrinsic Motivation, Satisfaction with the Program and Student's Engagement

In the [Spreitzer et al. \(2005\)](#) theoretical model, certain psychological resources (such as knowledge, positive affective resources, positive meaning, and relational resources) are seen as the distal antecedents of thriving at work. In this particular context, we argue that one's intrinsic motivation to perform a certain type of task (in this case academic research) is a psychological resource that will play an especially important role. Motivation is often conceptualized as the psychological processes that are critical for sustaining individual action ([Latham & Pinder, 2005](#)) or "an inner desire to make an effort" (Dowling & Sayles, 1978: 16). Rather than focusing solely on external motivators of individual action (Steers, Mowday, & Shapiro, 2004), work itself may be structured in a way that is intrinsically enjoyable and that provides a surplus of meaning for the individual (Deci & Ryan, 1985). Intrinsic motivation is defined as "the desire to engage in an activity because one enjoys, or is interested in, the activity" (Sheldon, Turban, Brown,

Barrick, & Judge, 2003: 359) and is related to activities that are rewarding in and of themselves (Deci, 1975).

Research has suggested that intrinsically motivated individuals are more likely to engage in exploration of diverse solutions and become absorbed in the process of performing the task. As a result, these individuals are more likely to devote sufficient time for the task resulting in above average performance (Amabile, Hill, Hennessey, & Tighe, 1994; Csikszentmihalyi, 1996; Ryan & Deci, 2000). In addition, this prolonged immersion in the task enables these individuals to generate creative solutions by devoting considerable amounts of attention to problem analysis, gathering relevant information and creating diverse alternatives (Amabile, 1988; Zhang & Bartol, 2010). Indeed, intrinsically meaningful work has been found to positively influence a wide variety of important outcomes in organizations including individual creativity (Amabile, 1996; Grant & Berry, 2011; Zhang & Bartol, 2010), job satisfaction (Wrzesniewski, McCauley, Rozin & Schwartz 1997), performance (Grant, 2008; Staw, 1977), engagement (May, Gilson, & Harter, 2004), and importantly, academic achievement (Boggiano 1998; Burton Lydon, D'Alessandro, & Koestner 2006; Lepper, Corpus & Iyengar, 2005).

Feelings of engagement are a particularly relevant correlate of intrinsic motivation. Kahn (1990: 694) defines engagement as “the harnessing of organization members’ selves to their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances.” Similarly, Rothbard (2001) defines engagement as a psychological state consisting of two central components: attention and absorption. Attention is conceptualized as a “cognitive availability and the amount of time one spends thinking about a role” and absorption as “being engrossed in a role and refers to the intensity of one’s focus on a role” (Rothbard , 2001: 656). Building on these two definitions, engagement can be portrayed as

an emotional and cognitive focus on a particular task that persists over time. In this view, intrinsic motivation becomes a critical enabler of engagement with a particular task by directing positive emotions toward the task, thus increasing both the time and effort devoted by an individual to that particular task. This definition and operationalization of engagement is also consistent with one of the agentic behaviors (task focus) described in the [Spreitzer et al. \(2005\)](#) model of thriving at work.

Although [Kahn \(1990\)](#) indicated that certain psychological conditions are necessary for engagement, Hackman and Oldham (1980) provided insight into the process. Specifically, they argued that the way intrinsic motivation influences task performance is through increasing engagement in the task. Similarly, Staw (1997) argued that intrinsically motivated individuals will derive positive feelings from performing a task and therefore be more highly engaged in the task. Additionally, [Kanfer \(1991\)](#) suggested that task engagement is a critical mechanism explaining the positive relationship between intrinsic motivation and individual levels of performance. More recently, [Piccolo and Colquitt \(2006\)](#) found that meaningfulness derived from work is critical in authentic self-development. In addition, authors have argued that when an individual feels intrinsically motivated by her work, she will more likely perceive the work as important and allow for the expression of her authentic self (Amabile, et al., 1994; Csikszentmihalyi, 1996; Spreitzer, 1996). This opportunity for expression of the authentic self fosters increased engagement in the work (defined here as the physical, cognitive, and emotional expression of the self in work). Building on these findings, we propose that:

Hypothesis 1: Ph.D. student intrinsic motivation is positively related to their experience of engagement.

In addition to individual difference factors (such as intrinsic motivation), the theoretical model of thriving at work suggests that individual perceptions of the context are also important ([Spreitzer et al., 2005](#)). When considering the experience of business Ph.D. students, the relevant context is the Ph.D. program of which they are a part. Therefore, we expect that a student's satisfaction with their program plays a role in determining the level of engagement they experience. While there has been little or no discussion of satisfaction with Ph.D. programs in the literature, there is a substantial literature dealing with job satisfaction, a related area. Thus, we will draw from this work to make inferences about the relationship between satisfaction and engagement in this context.

Job satisfaction is defined as “a pleasurable or positive emotional state resulting from the appraisal of one's job or job experience” (Locke, 1976: 1300). Therefore, Locke implicitly recognizes both the importance of positive affect and cognition in his definition as well as potentially diverse aspects of experience such as job characteristics, supervisors, and coworkers (Russell, Spitzmuller, Lin, Stanton, Smith, & [Ironson, 2004](#); [Saari & Judge, 2004](#)). In this view, cognition and affect are intricately connected: favorable evaluations of one's job circumstances impact their feelings about the job, which in turn make the cognitive appraisal more positive. This positive evaluation of complete experience in turn influences individuals to increase their task performance and contribute to overall organizational effectiveness (Eagly & Chaiken, 1993; Judge, et al., 2001). Indeed, Judge, et al. (2001), in a comprehensive review, found that the average correlation between job satisfaction and job performance is .30.

Although extant research has been particularly scarce, there is reason to believe that satisfaction with the program will be positively related to feelings of engagement with one's research. For example, Hagerdon (2000) argued that faculty who are highly satisfied with their

job, are more likely to appreciate their position resulting in higher engagement and overall productivity. Similarly, [Kahn \(1990\)](#) argued that psychological meaningfulness is derived from particular characteristics of the job itself, including variety of skills, personal discretion and opportunities to make relevant contributions to the organization. Similarly, [Saks \(2006\)](#) found that job characteristics are positively related to engagement. As such, it is reasonable to conclude that positive job characteristics will result in favorable evaluations of the job and correspondingly higher satisfaction with the job. Furthermore, relationship with coworkers and supervisors is also a critical component of job satisfaction ([Russell, et al., 2004](#)). That is, individuals who evaluate their relationships in organization as positive are more likely to be satisfied with their job. Importantly, [Saks \(2006\)](#) describes engagement as an individual's reaction to job satisfaction. Thus, employees will decide to engage themselves to varying degrees in order to repay to their organizations for the resources and support they receive. Building on these findings, we suggest that Ph.D. students' satisfaction with the Ph.D. program, which is affected by factors such as positive relationships between students and their mentors, access to important resources to conduct their research, and the positive characteristics of their everyday tasks, is positively related to students' feelings of engagement:

Hypothesis 2: Ph.D. student satisfaction with program is positively related to their experience of engagement.

Ph.D. Student Engagement and Thriving

According to [Spreitzer et al. \(2005\)](#), people who thrive experience a sense of forward momentum that is characterized by learning and vitality. Learning is characterized by the acquisition and application of new knowledge and skills ([Elliott & Dweck, 1988](#)) and vitality denotes positive feelings associated with having energy and zest (Bernstein, 2004). Although

learning and vitality have been studied independently, recent research focusing on thriving at work indicates there are benefits to considering them jointly. This is because experiencing both of these psychological states simultaneously at work is associated with favorable outcomes for individuals and organizations (see Spreitzer, Porath, & Gibson, 2012 for a review).

Spreitzer et al. (2005) stated that agentic behaviors (or active, self-directed behaviors) such as task focus, heedful relating, and exploration are the engine of thriving. In other words, those who are more active and purposeful at work are more likely to experience and sustain the two psychological states that define thriving. The description of task focus as provided in Spreitzer et al. (2005) is similar to the attention component of work engagement described here and by Rothbard (2001). Similarly, Kahn (1990) suggested that more vigilant, attentive, and focused behavior is critical in engagement. Therefore, engaged employees are more likely to experience a sense of thriving because they are cognitively, physically, and emotionally engaged in their work (Kahn, 1990; Rich, Lepine, & Crawford, 2010).

Individuals who are fully engaged with the task and pay close attention to their performances and the circumstances that surround them are more likely to notice additional opportunities for improvement. Additionally, they recognize situations where additional expertise is needed (Weick & Roberts, 1993). As a result, they will engage in learning (the first component of thriving). The link between engagement and vitality, the other component of thriving, is more controversial. Some scholars argue that investing energy into a work-related task can result in the depletion of energetic resources (see Edwards & Rothbard, 2000; Rothbard, 2001). However, the perspective adopted here and in the thriving at work literature posits that the affective benefits and sense of accomplishment that emerge from successful task competition more than make up for the energy required to engage in work and maintain task focus (Paterson

et al., 2013; Rich et al., 2010; Spreitzer et al., 2005) and therefore work engagement is positively associated with the vitality component of thriving. Building on these findings, we suggest that in the Ph.D. program context, engagement with one's tasks will be positively related to their experience of thriving:

Hypothesis 3: Ph.D. Students who are highly engaged with their tasks are more likely to experience thriving in their program.

Ph.D. Student thriving and their Research Productivity

Research findings to date indicate that thriving at work is a significant predictor of individual performance above and beyond attitudinal variables such as job satisfaction and organizational commitment (Paterson et al., 2013; Porath et al., 2012; Niessen et al., 2012; Spreitzer et al., 2012). Importantly, research has also shown that thriving is a critical antecedent to individual innovative performance and the generation of creative ideas (Carmeli & Spreitzer, 2009; Wallace et al., 2013). With its emphasis on learning and vitality, thriving presents an important facilitator of the drive necessary to sustain innovative endeavors such as scholarly research (Carmeli & Spreitzer, 2009). More specifically, thriving provides the personal resources one needs to conceptualize the solution as well as champion that solution throughout the organization. In addition, vitality enables the individual to endure cognitive and emotional demands, thus resulting in sustainable innovative performance. For example, employees who are thriving at work and see themselves successfully completing challenging activities are likely to have enhanced perceptions of self-worth and feel like valuable contributors to their groups or organizations.

Previous research into the connection of thriving to innovative performance and creativity is particularly relevant for this study, as research productivity in business Ph.D.

programs can often have similar demands to other innovative contexts. Similar to the stages of the innovative behavior process described by Janssen (2004), in order to ultimately produce scholarly work publishable in premier journals, Ph.D. students are required to not just produce new and creative ideas, but also solicit support for their ideas through proposals, presentations, and discussions with their peers and faculty. As such, the process before the actual publication is multifaceted and requires prolonged effort. Therefore we expect that Ph.D. students who report that they are thriving are more likely to successfully develop and sustain a stream of high quality scholarly work. Therefore, we hypothesize the following relationship.

Hypothesis 4: Ph.D. students who experience higher levels of thriving will report more research publications.

RESEARCH METHODS

Sample and Procedure

To test our proposed relationships, we administered a survey using the Qualtrics online survey system to a sample of Ph.D. students. Our survey targeted current Ph.D. students from business programs in the United States, Europe, and Australia. Potential participants for this survey were contacted using a proprietary database of email addresses of current business Ph.D. which was compiled by visiting the websites of each Ph.D.-granting institution and collecting the names and email addresses of current Ph.D. students. There were 98 schools that provided the names and email addresses of their Ph.D. students on their website. The total number of email addresses collected and used in our survey invitation email was 3,936. Of these, 569 students (14.5% response rate) initiated the survey but fewer than half of these actually completed it. Our final sample, after removing responses for missing data, consisted of 259 Ph.D. students (usable response rate = 4.6%)

In the overall sample, 35.5% of Ph.D. students were management majors; 14.7% were accounting majors; 13.9% were marketing majors; 11.2% were operations/MIS majors; 9.7% were industrial/organizational psychology majors; 7.0% were finance majors; and 8.1% indicated another major. In terms of ethnic dispersion, 69.1% of the respondents were Caucasian; 16.2% of respondents were Asian; 7.3% of the respondents were other; and the remaining respondents were African American, Hispanic, or Native American. The average age of respondents was 32.1 years, and the average year in program for respondents was third year.

Measures

Intrinsic motivation. To measure intrinsic motivation we utilized a five-item measure from Tierney, Farmer, and Graen (1999) wherein respondents use a six-point scale ranging from “strongly disagree” to “strongly agree.” A sample item is “I enjoy coming up with new ideas for projects.” The alpha reliability coefficient was .80.

Satisfaction with the Ph.D. program. We adapted the five-item satisfaction with life scale created by Diener, Emmons, Larsen, and Griffin (1985) to measure satisfaction with program. We substituted the phrase “Ph.D. program” for the word life in each item. Respondents utilized a seven-point response scale ranging from “strongly disagree” to “strongly agree.” A sample item is “I am satisfied with my Ph.D. program.” The alpha reliability coefficient was .92.

Engagement. We measured engagement by adapting the four-item attention and five-item absorption scales used by Rothbard (2001). The measure uses a seven-point response scale ranging from “strongly disagree” to “strongly agree.” Sample items include “I pay a lot of attention to my work” (attention) and “when I am working, I am totally absorbed by it” (absorption). The alpha reliability coefficient was .90.

Thriving. To measure thriving we adapted 8 items from [Porath et al. \(2012\)](#). The adapted measure includes 4 items for learning and 4 items for vitality. A sample item for learning is “I continue to learn more and more as time goes by.” A sample item for vitality is “I feel alive and vital.” The Cronbach alpha was .93.

Research Productivity. To measure Ph.D. student research productivity we used a composite measure that included a weighted sum of top-tier publications, peer-reviewed non-top-tier publications, non-peer-reviewed publications, and book chapters. Students reported their total number of each type of research article accepted for publication. We weighted the items for each respondent as follows: each top-tier journal publication that was published, had a revise and resubmit, or was under review was multiplied by three; each peer-reviewed journal publication that was published, had a revise and resubmit, or was under review was multiplied by two; each non-peer reviewed journal publication that was published, had a revise and resubmit, or was under review was multiplied by one; and each book chapter publication that was published, had a revise and resubmit, or was under review was multiplied by one. These weighted values were then summed for each respondent to create a weighted sum of research productivity (we also obtained similar results using a non-weighted measure of research productivity but we decided to utilize this weighted measure in our final analyses as it more accurately reflects the extra value that top-tier journal publications hold in the eyes of many academics).

Control variables. We included student age and year in program as control variables in our data analysis. Age has been related to other desirable individual work outcomes (Cleveland & Shore, 1992), therefore we controlled for any association of age with the variables of interest in this study. In addition, we controlled for year in program. Throughout a Ph.D. program, students learn about research, teaching and service, and transform from students to candidates to

faculty members. Further, the first-year requirements of many Ph.D. programs include coursework and teaching or research assistantships; whereas the requirements shift in the fourth and fifth years in the program to dissertation work, teaching, and research presentations. We control for year in program to capture any effect that these differences in experience and requirements may have on the relationships of interest in this study.

Analytic Procedures

Structural equation modeling (SEM) ([Bollen, 1989](#)) using Mplus 5.2 (Muthén & Muthén, 2007) was used to test the hypotheses. SEM is a widely-recognized approach to examine mediation models with latent variables. Following the approach of Anderson and Gerbing (1988), we first examined the fit of the confirmatory factor analysis (CFA) to test the adequacy of the measurement model, and then subsequently examined the structural model.

Because our data were collected from a single source at a single point in time, common method variance may be a factor in our analyses (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In order to assess the degree to which our data is subject to common method variance, we conducted Harman's single-factor test, which is the most widely used test for this purpose ([Podsakoff et al., 2003](#)). We loaded all of the items from our study variables onto one factor in an exploratory factor analysis and examined if the one-factor solution accounts for the majority of the covariance. Our results indicate that the single factor does not account for the majority of the covariance of our measures. Thus, we conclude that common method bias does not play a significant role in our results.

RESULTS

Table 1 provides the descriptive statistics and correlations for the study variables. The independent variable, intrinsic motivation, demonstrated a significant, positive correlation with

engagement ($r = .34, p < .001$), thriving ($r = .37, p < .001$) and productivity ($r = .14, p < .05$), but did not have a significant relationship with satisfaction ($r = .12$). The independent variable, satisfaction, was significantly and positively related to engagement ($r = .25, p < .001$), thriving ($r = .49, p < .001$) and productivity ($r = .17, p < .01$). The variable, engagement, was significantly and positively related to thriving ($r = .51, p < .001$) and productivity ($r = .17, p < .01$). The control variable, age, was significantly and positively related to engagement ($r = .15, p < .05$). The control variable, year, was significantly and negatively related to intrinsic motivation ($r = -.16, p < .01$), satisfaction in the program ($r = -.17, p < .01$) and thriving ($r = -.21, p < .001$) and significantly and positively related to productivity ($r = .21, p < .001$) and age ($r = .19, p < .01$).

 Insert Table 1 about here

The results of the CFA were supportive of our measurement model as indicated by the combined evidence of several fit indices (CFI=. 92, TLI=. 911, RMSEA =. 07, SRMR=. 06) (Hu & Bentler, 1999). The fit of our proposed measurement model was also superior to two alternative models. In the first alternative model, we collapsed the independent variables (intrinsic motivation and satisfaction with program) into a single factor and the fit was inferior to the original measurement model (CFI = .83, TLI = .81, RMSEA = .09, SRMR = .12). Next, we combined the two mediation variables (thriving and engagement) which also resulted in worse fit than our original measurement model (cfi = .70, TLI = .68, RMSEA = .12, SRMR = .10).

Having established adequate fit of the measurement model, we then utilized Structural Equation Modeling (SEM) using Mplus 5.2 (Muthén & Muthén, 2007) to test the study hypotheses. The fit of the proposed model is acceptable based on the combined evidence of fit indices (CFI=. 90, TLI=. 89, RMSEA =. 07, SRMR=. 08) (Hu & Bentler, 1999). Table 2 provides

the results of the SEM analyses. Figure 2 presents the standardized path coefficients of the hypothesized model.

 Insert Table 2 about here

 Insert Figure 2 about here

The first hypothesis predicted that Ph.D. student intrinsic motivation is positively related to their experience of engagement with their work. This hypothesis was supported ($\beta = .431$, $p < .001$). The second hypothesis predicted that Ph.D. student satisfaction with the program is positively related to their experience of engagement. This hypothesis was supported ($\beta = .281$, $p < .001$). Hypothesis 3 predicted that Ph.D. students who are highly engaged with their tasks are more likely to experience thriving in their Ph.D. program. This effect was also significant ($\beta = .740$, $p < .001$). Finally, hypothesis 4 predicted that Ph.D. students who experience higher levels of thriving will have a stronger publication record. This hypothesis was supported as well ($\beta = .206$, $p < .01$).

DISCUSSION

This study offers a rare glimpse into the experiences of business Ph.D. students and the factors which contribute to their success in academic publishing. The results of the study are critical because (1) the academic job market has tightened resulting in increased pressure on Ph.D. students to conduct research that can result in top-tier publications and (2) there is a dearth of research analyzing how Ph.D. students respond to these demands and successfully translate this pressure into relevant scholarly work. Building on prior theorizing regarding thriving at work, and integrating the engagement, intrinsic motivation, and job satisfaction literatures, this paper explicates some of the mechanisms that contribute to Ph.D. student research productivity.

Our theory-derived model argues that intrinsic motivation and satisfaction with the program are critical antecedents to Ph.D. students' engagement in their work. Engagement in turn facilitates higher levels of thriving and ultimately higher research productivity. Results from a study of 259 Ph.D. students in the U.S., Europe, and Australia provide strong support for our hypothesized model. The results of this study have several important theoretical and practical implications.

Perhaps the most significant contribution is an increased understanding of Ph.D. student research productivity. Research productivity is receiving increasing attention in business schools with accompanying pressure on faculty (and Ph.D. students) to publish (Certo, et al., 2010; Gill, 2009). In this environment, publications in a field's premier journals are indicative of not just current scholarly productivity but also student's future scholarly potential. As a result, Ph.D. students are expected to come up with new research ideas and research questions early in their career that result in publications clearly demonstrating potential as a future productive scholar and secure future employment (Pearce & Huang, 2012). Yet, systematic research into how Ph.D. students deal with this new reality is absent.

Our results indicate that Ph.D. students who report that they experience a sense of thriving in their Ph.D. program are more likely to have a successful publication record. This finding is important because it illustrates the critical role that both cognitive resources (learning) and affective resources (vitality) play in helping Ph.D. students sustain their research efforts. While the link between learning and publication success may be unsurprising, it is the combination of learning with vitality that allows students to feel that they are thriving. Given the demanding nature of research activities as well as the publication process itself (Certo et al., 2010) students with high levels of energy coupled with continuous learning may be best equipped to respond in the most productive manner. This finding also adds to recent research

into thriving at work that suggests that thriving is indeed an important antecedent to individual work and innovative performance by exploring a unique type of performance heretofore unexplored in the thriving literature (Carmeli & Spreitzer, 2009; Paterson et al., 2013; Porath et al., 2012; Spreitzer et al., 2012, Wallace et al., 2013).

Additionally, this study further extends the socially-embedded model of thriving at work by proposing and empirically testing the relationship with engagement and thriving for the first time. Spreitzer et al. (2005) proposed that task focus is an agentic work behavior that promotes thriving at work and this relationship has been confirmed previously (Niessen et al., 2012; Paterson et al., 2013). While there are some obvious similarities between task focus and engagement, there are also some differences as well (see Spreitzer, Lam, & Fritz, 2010 for a more thorough discussion of thriving and engagement). Engagement, as defined and operationalized here (and in Rothbard, 2001) includes not only attention (or task focus) but also absorption. Thus, we go beyond previous investigations of thriving by looking at its relationship with both dimensions of work engagement. Our study provides empirical evidence of the link between engagement and thriving and demonstrates that engagement at work is an important antecedent to the experience of thriving at work, especially in an academic context.

Finally, our findings contribute to the engagement literature by showing that intrinsic motivation and satisfaction with the program are critical facilitators of Ph.D. student's engagement with their work. The positive relationship between intrinsic motivation and engagement was indirectly suggested in job characteristics research by Hackman and Oldham (1980) as well as Staw (1997) and Kanfer (1991). The findings of this study provide empirical evidence of engagement's mediating role between intrinsic motivation and performance as suggested by Kanfer (1991). As stated previously, this finding is also supportive of the socially-

embedded model of thriving at work (Spreitzer et al, 2005) which proposes that agentic behaviors (such as engagement) are antecedents to thriving at work.

In addition to theoretical implications, our study also has several practical implications for Ph.D. programs, faculty advisors to Ph.D. students, and business Ph.D. students. First, while all Ph.D. programs focus on learning as an important program outcome, this study suggests that student vitality (or energy) should also be a primary concern. Students and programs who focus solely on learning and fail to provide means for students to maintain their energy may find that Ph.D. students will be unable to sustain their learning in the future and will likely see their research productivity suffer. Research on energy (e.g. Fritz, Lam, & Spreitzer, 2011) has shown that focusing on the meaning of one's work and positive workplace relationships have the strongest impact on human energy. Thus, Ph.D. programs should strive to make salient the positive impact that scholars can have for good and also facilitate environments wherein Ph.D. cohorts can be friendly and collaborative rather than overly competitive. Students can also utilize tools to learn about and improve their own energy management (see, for example, Spreitzer & Grant, 2012). Our results also indicate that both satisfaction with program and intrinsic motivation are critical for a Ph.D. students' research productivity. Perhaps the most obvious, yet probably under-utilized technique for gauging Ph.D. student satisfaction is simply to ask. There are probably very few one-size-fits-all recommendations regarding crafting Ph.D. programs that will be satisfying to students but taking the pulse of the students on occasion and asking for their input regarding major program decisions and changes would probably be a good starting point. Finally, although most Ph.D. program directors already realize that recruiting students with high intrinsic motivation is critical, this study confirms this. Devising effective means of gauging potential students' motivation upon entering the program is therefore a primary concern.

Limitations and Future Research

Although our research addresses an under-studied topic, uses a sample that is difficult to access, and our results bring to the forefront several important implications for management Ph.D. education, our study also has potential limitations that need to be recognized which future research may address. First, although the main focus of the study was to research productivity within management and business Ph.D. programs, this focus may limit the generalizability of our findings to other contexts. In other words, although we are confident in our results within this particular domain, we can only speculate whether the model will hold in other settings such as other academic disciplines or in R&D departments in industry. It is reasonable to conclude that our findings will be relevant in other dynamic, demanding and knowledge-intensive settings, but future research needs to explore this generalization.

Additionally, although the study's outcome variable is objective, the other variables are self-reported. Given the nature of the variables in this study, using self-report measures is warranted. However, future studies can attempt to include other non-self-reported variables to build on the robustness of these results. The incorporation of other, non-self-reported variables, such as variables provided by managers, colleagues, or other objective measures could add to our understanding of the antecedents of research productivity among Ph.D. students.

CONCLUSION

Research productivity is critical for the success of Ph.D. students seeking a research-oriented career in academia. Yet, to date there has been no systematic analysis of the antecedents of research productivity within the context of management and business Ph.D. programs. To

address this gap, we integrate the research behind job satisfaction, intrinsic motivation, engagement, and thriving, to theorize and empirically examine our proposed model of Ph.D. student research productivity. Our study highlights the importance of the appropriate context that is conducive to Ph.D. students' thriving in their programs. Specifically, our findings indicate that heightened engagement with the research process itself may facilitate higher levels of thriving and correspondingly higher research performance in Ph.D. programs. Further, our findings suggest that students with higher intrinsic motivation and satisfaction with their program may be in the best position to use their resources to engage in with their work that can potentially pave the way for future success in academia.

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